Tribological behaviour of oral mixed biofilms

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The use of dental implants has been increasing even though failures do occur. The presence of wear debris and oral microorganisms can contribute to infections and jeopardize implant integration. The aim of this work was to study the influence of mixed biofilms in the tribological behaviour of commercially pure titanium for dental implants under different concentrations of fluoride. Samples of titanium with two different surface topographies were used. Mixed biofilms of Candida *albicans* and *Streptococcus mutans* were formed on both surfaces at 37 °C in a tryptic soy broth containing mucin, peptone, yeast extract and sucrose. After 8 days, biofilm biomass was analysed by crystal violet staining method. Biofilm biomass was significantly higher for the samples with higher roughness. Some samples with biofilms were analysed under friction (using a force of 100 mN) in an artificial saliva solution (Fusayama) without or with different concentrations of fluoride (30 and 227 ppm). It was verified that the coefficient of friction (COF) decreased in the presence of biofilms. Moreover, samples with more biomass (0.4 μm of roughness) presented the lowest values of COF. Concerning the effect of the presence of fluoride, although there were no significant differences on the COF for 30 ppm, for 227 ppm a transition regimen was observed. These results were confirmed by sample observation under scanning electron microscopy.

In conclusion, it can be highlighted that biofilm formation on dental implants can significantly affect the tribological behaviour of titanium, namely, the presence of biofilms reduces the release of wear debris.